

## ABSTRACT

In one embodiment of the invention, a virtual volume is divided into “filled” and “empty” virtual volume (VV) regions. Empty VV regions are mapped to a special zero logical disk that does not consist of any physical disk regions. When a host writes to an empty VV region, a logical disk (LD) region is allocated to the empty VV region so the formerly empty VV region becomes a filled VV region mapped to the allocated LD region. If there are no LD regions available, a new logical disk is created. Additional physical storage can be added to the storage server to create new logical disks as the use of the virtual volume grows. Physical allocation warning points and limits allow the system administrator to be alerted to and to control physical allocation for each individual VV and the set of VVs drawing from the same data allocation control structure (DC).